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☐ 1. Document ID: US 6503572 B1

L9: Entry 1 of 25 File: USPT Jan 7, 2003

US-PAT-NO: 6503572
DOCUMENT-IDENTIFIER: US 6503572 B1

TITLE: Silicon carbide composites and methods for making same

DATE-ISSUED: January 7, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Waggoner; W. Michael	Newark	DE		
Rossing; Barry R.	Newark	DE		
Richmond; Michael A.	Newark	DE		
Aghajanian; Michael K.	Newark	DE		
McCormick; Allyn L.	Oxford	PA		

US-CL-CURRENT: 427/431; 427/228, 427/294, 427/376.6, 427/383.5

ABSTRACT:

Improved silicon carbide composites made by an infiltration process feature a metal phase in addition to any residual silicon phase. Not only are properties such as mechanical toughness improved, but the infiltrant can be so engineered as to have much diminished amounts of expansion upon solidification, thereby enhancing net-shape-making capabilities. Further, multi-component infiltrant materials may have a lower liquidus temperature than pure silicon, thereby providing the practitioner greater control over the infiltration process. In particular, the infiltration may be conducted at the lower temperatures, where low-cost but effective bedding or barrier materials can terminate the infiltration process once the infiltrant has migrated through the permeable mass up to the boundary between the mass and the bedding material.

33 Claims, 3 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 2. Document ID: US 6486447 B2

L9: Entry 2 of 25 File: USPT Nov 26, 2002

US-PAT-NO: 6486447
DOCUMENT-IDENTIFIER: US 6486447 B2

TITLE: Method of manufacturing an electric heating element

DATE-ISSUED: November 26, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Miyata; Seiichiro	Yamaguchi 752-0964			JP

US-CL-CURRENT: 219/444.1; 219/548, 29/610.1

ABSTRACT:

In order to eliminate the drawback of an electric heating element formed on an insulating ceramic substrate so that the element is brittle and becomes soft at a high temperature, an electrically heat-generating material film having a microstructure composed of a silicide alone, a mixture of silicide and Si, or Si alone is fused to the surface of a nitride or carbide ceramic insulating substrate.

In order to provide an electrostatic chuck by which the temperature of an electrostatically chucked object to be treated, such as a semiconductor substrate, is quickly and precisely controlled, a heating mechanism is coupled with the bottom face of an electrostatically chucking mechanism provided with a dielectric ceramic and electrodes formed on the bottom face of the ceramic, and a cooling mechanism is coupled with the bottom face of the heating mechanism. The heating mechanism has a fusable electric-heating material film between two ceramic insulating substrates having the same or nearly the same coefficients of thermal expansion. The films is fused to the substrates.

14 Claims, 26 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 12

☐ 3. Document ID: US 6485816 B2

L9: Entry 3 of 25 File: USPT Nov 26, 2002

US-PAT-NO: 6485816
DOCUMENT-IDENTIFIER: US 6485816 B2

TITLE: Laminated radiation member, power semiconductor apparatus, and method for producing the same

DATE-ISSUED: November 26, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Araki; Kiyoshi	Ann Arbor	MI		
Kida; Masahiro	Nagoya			JP
Ishikawa; Takahiro	Nagoya			JP
Bessyo; Yuki	Aichi			JP
Makino; Takuma	Kasugai			JP

US-CL-CURRENT: 428/210; 257/E23.098, 257/E23.106, 428/209

ABSTRACT:

A laminated radiation member includes a radiation plate, an insulation substrate bonded to the upper surface of the radiation plate and an electrode provided on the upper surface of the insulation substrate. The laminated radiation member is made by a method including the steps of surface treating a bonding surface of the radiation plate and/or the insulation substrate, interposing ceramic particles surface treated to assure wettability with a hard solder or a metal between the radiation plate and the insulation substrate, disposing a hard solder above and/or below the ceramic particles, heating the hard solder to a temperature higher than the melting point of the solder, penetrating the molten hard solder into spaces between the ceramic particles to react

the ceramic particles with the solder to produce a metal base composite material, and bonding the radiation plate and the insulation substrate with the metal base composite material.

6 Claims, 4 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 4. Document ID: US 6478994 B1

L9: Entry 4 of 25 File: USPT Nov 12, 2002

US-PAT-NO: 6478994
DOCUMENT-IDENTIFIER: US 6478994 B1

TITLE: Method for making boron carbide containing ceramics

DATE-ISSUED: November 12, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Sneddon; Larry G.	Newtown Square	PA		
Pender; Mark J.	Philadelphia	PA		

US-CL-CURRENT: 264/43; 264/625, 423/291, 427/249.5

ABSTRACT:

A method for making a boron carbide containing ceramic involves pyrolyzing a precursor having one or more monosubstituted decaboranyl groups and at least one substituting group containing carbon. The precursor may be molecular, for example comprising two decaboranyl groups linked by a single substituting group, or polymeric, in which case the decaboranyl groups are part of the pendant group of the polymer while a portion of the substituting group makes up the polymer backbone. In either case, the substituting group may be a hydrocarbon, in which case boron carbide may be formed. Alternatively, the substituting group may contain carbon and another ceramic forming element (i.e., other than boron or carbon), such as silicon, nitrogen, or phosphorous, in which case a composite including boron carbide is formed. The precursors used in the present invention are relatively stable in air, allow access to both boron rich and carbon rich materials, and further allow for the formation of films, fibers, and nanostructured materials more easily than other precursors.

30 Claims, 13 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 3

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 5. Document ID: US 6462410 B1

L9: Entry 5 of 25 File: USPT Oct 8, 2002

US-PAT-NO: 6462410
DOCUMENT-IDENTIFIER: US 6462410 B1

TITLE: Integrated circuit component temperature gradient reducer

DATE-ISSUED: October 8, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Novotny; Shlomo D.	Wayland	MA		
Vogel; Marlin R.	Brentwood	CA		

US-CL-CURRENT: 257/707; 257/704, 257/706, 257/712, 257/713, 257/717, 257/720, 257/723, 361/704, 361/705, 361/715, 361/716

ABSTRACT:

An integrated circuit device including an integrated circuit die having at least a first and a second heat-generating components formed thereon, and a heat dissipation structure thermally coupled to the die to dissipate heat generated by the components. The heat dissipating characteristics of the heat dissipation structure are tailored to match the heat generated by each of the first and second components.

31 Claims, 9 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 9

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Drawi Desc | Image

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☐ 6. Document ID: US 6448538 B1

L9: Entry 6 of 25 File: USPT Sep 10, 2002

US-PAT-NO: 6448538
DOCUMENT-IDENTIFIER: US 6448538 B1

TITLE: Electric heating element

DATE-ISSUED: September 10, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Miyata; Seiichiro	Yamaguchi 752-0964			JP

US-CL-CURRENT: 219/444.1; 219/543, 219/548, 252/506

ABSTRACT:

An electric heating element formed on an insulating ceramic substance includes and electrically heat-generating material film having a microstructure composed of a silicide alone, a mixture of silicide and Si, or Si along fused to the surface of sintered nitride or carbide ceramic insulating substrate. A heating mechanism is coupled with the bottom face of an electrostatically chucking mechanism provided with a dielectric ceramic and electrodes formed on the bottom face of face of the heating mechanism. The heating mechanism has a fusable electric-heating material film between two ceramic insulting substrates having the same or nearly the same coefficients of thermal expansion. The films is fused to the substrates.

10 Claims, 26 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 12

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Drawi Desc | Image

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☐ 7. Document ID: US 6447894 B1

L9: Entry 7 of 25 File: USPT Sep 10, 2002

US-PAT-NO: 6447894
DOCUMENT-IDENTIFIER: US 6447894 B1

TITLE: Silicon carbide composite, method for producing it and heat dissipation device employing it

DATE-ISSUED: September 10, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hirotsuru; Hideki	Tokyo			JP
Nomura; Kenji	Tokyo			JP
Terasaki; Ryuichi	Tokyo			JP
Saito; Mitsuaki	Tokyo			JP
Hiruta; Kazuyuki	Tokyo			JP
Miyai; Akira	Tokyo			JP

US-CL-CURRENT: 428/307.7; 257/E23.112, 428/313.3, 428/313.9, 428/315.9, 428/317.9, 428/318.4, 428/319.1, 428/545

ABSTRACT:

A silicon carbide composite which is a flat composite comprising a porous preform of silicon carbide and a metal containing aluminum as the main component, infiltrated into the porous preform, said composite having a warpage of at most 250 .mu.m per 10 cm of the principal plane length of the composite.

11 Claims, 23 Drawing figures
Exemplary Claim Number: 10
Number of Drawing Sheets: 6

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 8. Document ID: US 6355340 B1

L9: Entry 8 of 25 File: USPT Mar 12, 2002

US-PAT-NO: 6355340
DOCUMENT-IDENTIFIER: US 6355340 B1

TITLE: Low expansion metal matrix composites

DATE-ISSUED: March 12, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Singh; Jai R.	Shelton	CT		
Andersson; Clarence A.	Wallingford	PA		

US-CL-CURRENT: 428/312.8; 428/304.4, 428/311.51, 428/312.2

ABSTRACT:

A low to near-zero metal matrix composite material featuring high modulus carbon fibers reinforcing a lightweight metal or semimetal. The fibers have a negative coefficient of thermal expansion in the axial direction. Laminates featuring parallel arrays of fibers

may be cross-plied to produce quasi-isotropic properties in the composite body. The CTE of the composite body depends not only upon the relative CTE's of the fibers and matrix, and their relative amounts (e.g., loadings), but also upon the relative elastic moduli of the fibers and matrix. By intentionally introducing porosity into the matrix, the elastic modulus of the matrix is reduced, and thus the CTE of the composite body is influenced more by the CTE contribution of the fibers. In effect, the composite CTE is shifted toward that of the fibers, which shifting represents a reduction in composite CTE. Hydrogen outgassing upon solidification of the metallic matrix is one technique for producing such porosity.

23 Claims, 4 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

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☐ 9. Document ID: US 6299521 B1

L9: Entry 9 of 25 File: USPT Oct 9, 2001

US-PAT-NO: 6299521
DOCUMENT-IDENTIFIER: US 6299521 B1

TITLE: Polishing sheet

DATE-ISSUED: October 9, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Morimura; Yasuhiro	Kodaira			JP
Kotsubo; Hidefumi	Kodaira			JP

US-CL-CURRENT: 451/533; 451/534, 451/538, 451/539, 51/293

ABSTRACT:

The invention provides a polishing sheet comprising a support and an abrasive layer formed thereon with an adhesive layer interposed therebetween, characterized in that the adhesive layer is formed by a cured layer of a thermosetting and/or photo-curable curable adhesive composition based on at least one resin selected from the group consisting of

(A) an ethylene-vinyl acetate copolymer,

(B) a copolymer of ethylene, vinyl acetate, and an acrylate and/or methacrylate monomer,

(C) a copolymer of ethylene, vinyl acetate, and maleic acid and/or maleic anhydride,

(D) a copolymer of ethylene, an acrylate and/or methacrylate monomer, and maleic acid and/or maleic anhydride, and

(E) an ionomer resin in the form of an ethylene-methacrylic acid copolymer whose molecules are bonded by a metal ion.

26 Claims, 2 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

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☐ 10. Document ID: US 6245439 B1

L9: Entry 10 of 25 File: USPT Jun 12, 2001

US-PAT-NO: 6245439
DOCUMENT-IDENTIFIER: US 6245439 B1
** See image for Certificate of Correction **

TITLE: composite material and method for the manufacture

DATE-ISSUED: June 12, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Yamada; Katsunori	Aichi			JP
Kamiya; Nobuo	Aichi			JP
Asai; Mitsuru	Aichi			JP
Hohjo; Hiroshi	Aichi			JP

US-CL-CURRENT: 428/546; 264/109, 338/22R, 428/116, 428/221, 428/323, 428/331, 442/2, 442/50

ABSTRACT:

This invention concerns a composite material which is characterized by comprising a large number of composite material cells, as structural units of the composite material, each comprising a first phase composed of a base material and a second phase composed of a dispersion material surrounding the first phase discontinuously; and comprising a matrix comprising the base material and the dispersion material dispersed in the matrix, the dispersion material being dispersed discontinuously in the form of a three-dimensional network in the composite material; wherein the dispersion materials of the composite material cells are combined to form a composite material skeletal part, thereby exhibiting properties of the dispersion material without reducing the strength of the matrix owing to the skeletal part, and improving strength characteristics thereof owing to the skeletal part serving as a resistance to external stress. A preferred embodiment of the invention provides a composite material characterized in that it comprises a base material, a reinforcing layer comprising a material which resembles the base material and is dispersed continuously in the form of a three-dimensional network in the base material, and dispersion material which is dispersed discontinuously within the material of the reinforcing layer, so that the dispersion material is dispersed discontinuously in the form of a three-dimensional network in the base material, and provides a method for the manufacture of this composite material.

55 Claims, 31 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 19

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 11. Document ID: US 6238454 B1

L9: Entry 11 of 25 File: USPT May 29, 2001

US-PAT-NO: 6238454
DOCUMENT-IDENTIFIER: US 6238454 B1

TITLE: Isotropic carbon/copper composites

DATE-ISSUED: May 29, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Polese; Frank J.	San Diego	CA	92126	
Engle; Glen B.	Poway	CA		
Ocheretyansky; Vladimir	Santee	CA		

US-CL-CURRENT: 75/243; 257/E23.112, 419/11, 419/17, 419/20, 419/23, 419/38, 419/45, 419/58, 75/247

ABSTRACT:

Heat-dissipating microcircuit substrate, having coefficients of thermal expansion adjusted to match the materials of the microcircuit mounted thereupon, are manufactured by powder metallurgy using carbides resulting from the combination of various types of carbons and wetting agents.

22 Claims, 8 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 4

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

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☐ 12. Document ID: US 6191478 B1

L9: Entry 12 of 25 File: USPT Feb 20, 2001

US-PAT-NO: 6191478
DOCUMENT-IDENTIFIER: US 6191478 B1

TITLE: Demountable heat spreader and high reliability flip chip package assembly

DATE-ISSUED: February 20, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Chen; Kim H	Fremont	CA		

US-CL-CURRENT: 257/718; 257/E23.086

ABSTRACT:

A demountable heat spreader assembly utilizing a unique retainer frame for demountably retaining a heat spreader having a flexible thermal interface material disposed in a cavity of the heat spreader is disclosed. The retainer frame allows a substrate having a flip chip IC mounted thereon to be snapped into the retainer frame. The heat spreader also snaps into the retainer frame and is positioned in the retainer frame so that the flexible thermal interface material contacts the IC with a slight interference. The flexible thermal interface material provides effective thermal coupling between the IC and the heat spreader and loose mechanical coupling between the IC and heat spreader. Thermomechanical stress caused by heating or cooling of the IC is reduced by the loose coupling between the IC and the flexible thermal interface material. The retainer frame allows for the heat spreader and the substrate to be removed and can be made from low cost materials such a plastic.

20 Claims, 10 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 5

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

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☐ 13. Document ID: US 6011697 A

L9: Entry 13 of 25 File: USPT Jan 4, 2000

US-PAT-NO: 6011697
DOCUMENT-IDENTIFIER: US 6011697 A

TITLE: Constraining ring for use in electronic packaging

DATE-ISSUED: January 4, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Budnaitis; John J.	Eau Claire	WI		
Fischer; Paul J.	Eau Claire	WI		
Hanson; David A.	Altoona	WI		
Noddin; David B.	Eau Claire	WI		
Sylvester; Mark F.	Eau Claire	WI		
Petefish; William George	Eau Claire	WI		

US-CL-CURRENT: 361/792; 174/255, 174/257, 174/258, 257/701, 257/702, 257/706, 257/E23.006, 257/E23.106, 257/E23.135, 361/719, 361/720, 361/761, 361/764, 361/766, 361/768, 361/771, 428/901, 438/118, 438/125

ABSTRACT:

A constraining ring increases the modulus of an interconnect substrate to maintain flatness of the substrate. The constraining ring is made of materials selected to match the coefficient of thermal expansion of the substrate to that of the constraining ring. Circuit components including capacitors and resistors are formed on the constraining ring to provide enhanced electrical properties without adding to the size of the device.

17 Claims, 14 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 11

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 14. Document ID: US 5879786 A

L9: Entry 14 of 25 File: USPT Mar 9, 1999

US-PAT-NO: 5879786
DOCUMENT-IDENTIFIER: US 5879786 A

TITLE: Constraining ring for use in electronic packaging

DATE-ISSUED: March 9, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Budnaitis; John J.	Eau Claire	WI		
Fischer; Paul J.	Eau Claire	WI		
Hanson; David A.	Altoona	WI		
Noddin; David B.	Eau Claire	WI		
Sylvester; Mark F.	Eau Claire	WI		
Petefish; William George	Eau Claire	WI		

US-CL-CURRENT: 428/209; 257/700, 257/701, 257/702, 257/703, 257/E23.006, 257/E23.106, 257/E23.135, 428/210, 428/220

ABSTRACT:

A constraining ring increases the modulus of an interconnect substrate to maintain flatness of the substrate. The constraining ring is made of materials selected to match the coefficient of thermal expansion of the substrate to that of the constraining ring. Circuit components including capacitors and resistors are formed on the constraining ring to provide enhanced electrical properties without adding to the size of the device.

6 Claims, 14 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 11

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

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☐ 15. Document ID: US 5720933 A

L9: Entry 15 of 25 File: USPT Feb 24, 1998

US-PAT-NO: 5720933
DOCUMENT-IDENTIFIER: US 5720933 A

TITLE: Process for preparing ceramic fibers

DATE-ISSUED: February 24, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Srinivasan; Makuteswara	Grand Island	NY	14072	

US-CL-CURRENT: 423/345; 423/344, 423/412, 501/95.1

ABSTRACT:

A process for preparing silicon carbide fiber by the carbothermal reduction of silica fiber. In the first step of the process, a specified silica fiber is contacted with a source of elemental carbon to produce a reactant mass; the silica fiber is comprised of at least about 99.5 weight percent of silica, has a density of at least about 2.15 grams per cubic centimeter, has a diameter of from about 1 to about 100 microns and an aspect ratio of at least about 30. From about 3.2 to about 5.0 moles of carbon are present in the carbon source for each mole of the silica. The reactant mass is heated at a temperature of from about 1,400 degrees centigrade to about 2,300 degrees centigrade for at least about 0.5 hours.

15 Claims, 13 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 5

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

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☐ 16. Document ID: US 5705122 A

L9: Entry 16 of 25 File: USPT Jan 6, 1998

US-PAT-NO: 5705122
DOCUMENT-IDENTIFIER: US 5705122 A

TITLE: A method of making a composite ceramic fiber from pre-ceramic polymers

DATE-ISSUED: January 6, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Curran; Dennis John Gerard	Wallis Wood, Dorking, Surrey, RH5 5RL			GB

US-CL-CURRENT: 264/625; 264/624, 264/626, 264/627, 264/671

ABSTRACT:

The invention pertains to a composite ceramic fibre which is made from a self-supporting composite polymeric fibre by the conjugate spinning of at least two dissimilar pre-ceramic polymers in shapes varying from cylindrical to ribbon-like, and pyrolysing the spun fibre to form a composite bilateral, core sheath or matrix-fibril ceramic fibre having regions with ceramic compositions derived from each of the polymers, enabling physical and chemical characteristics to be widely varied for use as matrix reinforcements and other applications. A pyrolysis furnace includes countercurrent controlled atmosphere gas flow for chemically stabilizing or modifying the fibres.

46 Claims, 2 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 17. Document ID: US 5483041 A

L9: Entry 17 of 25 File: USPT Jan 9, 1996

US-PAT-NO: 5483041
DOCUMENT-IDENTIFIER: US 5483041 A

TITLE: Thermocouple for a horizontal diffusion furnace

DATE-ISSUED: January 9, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Peck; Kevin B.	Soulsbyville	CA		
Erickson; Ronald E.	Jamestown	CA		

US-CL-CURRENT: 219/390; 219/385, 374/208, 392/407

ABSTRACT:

Performance of a high temperature diffusion furnace is enhanced by an improved multi-furnace module design. The furnace is constructed of materials suitable for clean room environments with an adjustable leveling frame assembly. A slide out assembly and heating element alignment mechanism of individual furnace tube modules with a heating element hoist mechanism allows for enhanced maintainability. Heat treatment performance is improved by a sealed heating element with individual furnace module cooling system. Improved thermocouple positioning and composition has also enhanced heat treatment process control and heating element maintainability.

26 Claims, 17 Drawing figures
Exemplary Claim Number: 10
Number of Drawing Sheets: 13

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 18. Document ID: US 5461214 A

L9: Entry 18 of 25 File: USPT Oct 24, 1995

US-PAT-NO: 5461214
DOCUMENT-IDENTIFIER: US 5461214 A
**** See image for Certificate of Correction ****

TITLE: High performance horizontal diffusion furnace system

DATE-ISSUED: October 24, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Peck; Kevin B.	Soulsbyville	CA		
Erickson; Ronald E.	Jamestown	CA		
Matthews; Stephen H.	Sonora	CA		

US-CL-CURRENT: 219/390; 118/729, 219/409, 373/110, 432/122

ABSTRACT:

Performance of a high temperature diffusion furnace is enhanced by an improved multi-furnace module design. The furnace is constructed of materials suitable for clean room environments with an adjustable leveling frame assembly. A slide out assembly and heating element alignment mechanism of individual furnace tube modules with a heating element hoist mechanism allows for enhanced maintainability. Heat treatment performance is improved by a sealed heating element with individual furnace module cooling system. Improved thermocouple positioning and composition has also enhanced heat treatment process control and heating element maintainability.

24 Claims, 17 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 13

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 19. Document ID: US 5132145 A

L9: Entry 19 of 25 File: USPT Jul 21, 1992

US-PAT-NO: 5132145
DOCUMENT-IDENTIFIER: US 5132145 A

TITLE: Method of making composite material crucible for use in a device for making single crystals

DATE-ISSUED: July 21, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Valentian; Dominique	Vernon			FR

US-CL-CURRENT: 427/249.4; 204/192.16, 204/192.23, 427/249.15, 427/523, 427/530, 428/408

ABSTRACT:

A composite material crucible for a device for making single crystals having a single layer integrally-formed cylindrical wall made of composite materials in order to simultaneously provide mechanical strength and matching of its thermal conductivity to the thermal conductivity of a molten sample. The wall has an inner lining intimately and integrally bonded thereto for providing the functions of sealing and physical and chemical compatibility with the sample, without contamination thereof. A method for manufacturing the cylindrical crucible comprising selecting a composite material wall composition including fibers made of carbon or silicon carbide, and a matrix made of carbon or silicon carbide, making from the composite material a single layer integrally-formed cylindrical wall, and depositing on the cylindrical wall an optimized material to form an inner coating which is intimately and integrally bonded to the cylindrical wall.

16 Claims, 11 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 6

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

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☐ 20. Document ID: US 4913738 A

L9: Entry 20 of 25 File: USPT Apr 3, 1990

US-PAT-NO: 4913738
DOCUMENT-IDENTIFIER: US 4913738 A

TITLE: Heat-resistant composite body

DATE-ISSUED: April 3, 1990

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Tsukada; Kiyotaka	Ogaki			JP

US-CL-CURRENT: 75/236; 419/17, 419/2

ABSTRACT:

A heat-resistant composite body comprising a composite body of silicon carbide and metallic silicon, the metallic silicon existing in the porous silicon carbide sintered body. The silicon carbide particles constituting the silicon carbide sintered carbide sintered body have an average particle diameter of 5 .mu.m or less, and at least a part of the silicon carbide particles is present in the sintered body in the form of porous secondary particles bonded together. The interconnected pores comprise (i) a group of fine pores having a pore diameter of 3 .mu.m or less, constituted of fine crystalline silicon carbide particles having an average diameter of 5 .mu.m or less and (ii) a group of relatively coarse pores having a pore diameter of from 15 to 40 .mu.m, constituted of porous secondary particles which are bonded to have an average particle diameter of from 40 .mu.m to 150 .mu.m and have a particle size distribution such that 60% by weight or more of particles are included in .+-.20% of the average particle diameter. The metallic silicon is in an amount of from 45 to 140 parts by weight based on 100 parts by weight of the silicon carbide and fills the interconnected pores.

6 Claims, 0 Drawing figures
Exemplary Claim Number: 1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

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☐ 21. Document ID: US 4885199 A

L9: Entry 21 of 25 File: USPT Dec 5, 1989

US-PAT-NO: 4885199
DOCUMENT-IDENTIFIER: US 4885199 A

TITLE: Fiber-reinforced silicon nitride composite ceramics

DATE-ISSUED: December 5, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Corbin; Normand D.	Northborough	MA		
Willkens; Craig A.	Webster	MA		

US-CL-CURRENT: 428/113; 428/114, 428/212, 428/293.7, 428/312.6, 428/317.9, 428/332, 428/336, 501/92, 501/95.2, 501/97.4

ABSTRACT:

Tough composites of polymer derived silicon carbide fibers in silicon nitride matrices, especially reaction bonded silicon nitride matrices, can be made by precoating the fibers with pyrolytic carbon and controlling the nitridation or other process which forms the silicon nitride matrix so that a thickness of at least 5 nanometers of carbon remains in the composite after it is formed. Failure of such composites is non-catastrophic. Alternatively, with at least some specific types of polymer derived silicon carbide fibers, composites with non-catastrophic failure can be made by controlling the nitriding conditions to produce an essentially void space around the fibers in the final composites. As still another alternative, the space around the fibers may be partially filled with silicon nitride whiskers generated during the nitridation process.

14 Claims, 6 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 3

☐ 22. Document ID: US 4869943 A

L9: Entry 22 of 25 File: USPT Sep 26, 1989

US-PAT-NO: 4869943
DOCUMENT-IDENTIFIER: US 4869943 A

TITLE: Fiber-reinforced silicon nitride ceramics

DATE-ISSUED: September 26, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Corbin; Normand D.	Northborough	MA		
Hartline; Stephen D.	Millbury	MA		
Rossetti, Jr.; George A.	Worcester	MA		

US-CL-CURRENT: 428/114; 428/212, 428/293.7, 428/332, 428/336, 428/698, 501/92, 501/95.2, 501/97.4

ABSTRACT:

Very tough composites of silicon carbide fibers in silicon nitride matrices, especially reaction bonded silicon nitride matrices, can be made by precoating the fibers with

pyrolytic carbon and controlling the nitridation or other process which forms the silicon nitride matrix so that a thickness of at least 5 nanometers of carbon remains in the composite after it is formed. Failure of such composites is non-catastrophic.

7 Claims, 6 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 3

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

☐ 23. Document ID: US 4846673 A

L9: Entry 23 of 25 File: USPT Jul 11, 1989

US-PAT-NO: 4846673
DOCUMENT-IDENTIFIER: US 4846673 A

TITLE: Process for preparing heat-resistant composite body

DATE-ISSUED: July 11, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Tsukada; Kiyotaka	Ogaki			JP

US-CL-CURRENT: 432/5; 419/17, 419/23, 432/253, 432/6, 75/236

ABSTRACT:

A process for preparing a heat-resistant composite body, comprising forming silicon carbide crystal powder into a molded product, sintering the molded product in a non-oxidizing atmosphere, and thereafter filling with metallic silicon the inside of permeable voids of said porous body obtained by sintering. Powder having an average particle diameter of 5 .mu.m or less is used as said silicon carbide crystals to form it into secondary particles having an average particle diameter of from 40 to 150 .mu.m and such a particle size distribution that 60% by weight or more of particles are included in .+-.20% of the average particle diameter. This is followed by pressure molding to form a molded product using a molding pressure such that said granular secondary particles collapse at their surface areas to mutually bond there and at the same time the insides thereof remain uncollapsed, and also the molded product may have a bulk specific density of from 1.1 to 2.0 g/cm.sup.3. The molded product is heated to a temperature of from 1,400.degree. to 2,100.degree. C. to carry out sintering in a non-oxidizing atmosphere. Thereafter the inside of the resulting sintered body is filled with metallic silicon in an amount of from 45 to 140 parts by weight based on 100 parts by weight of the silicon carbide.

9 Claims, 0 Drawing figures
Exemplary Claim Number: 1

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

☐ 24. Document ID: US 4766013 A

L9: Entry 24 of 25 File: USPT Aug 23, 1988

US-PAT-NO: 4766013
DOCUMENT-IDENTIFIER: US 4766013 A

TITLE: Carbon composite article and method of making same

DATE-ISSUED: August 23, 1988

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Warren; James W.	Pacoima	CA		

US-CL-CURRENT: 427/228; 423/447.1, 423/447.3, 427/249.4, 427/250, 427/255.7, 428/367, 428/408

ABSTRACT:

A composite structural ceramic article and method of fabrication thereof. The article of the invention is specifically designed for use in high temperature, corrosive and erosive environments such as those found in heat engines, heat exchangers, stationary power equipments and industrial process equipments. The article comprises a porous carbon fibrous substrate or other suitable high temperature fibrous substrate which may include: a pyrolytic carbon or appropriate chemical vapor deposited sheath formed about each fiber of the substrate; a chemically vapor deposited metallic carbide, oxide, boride or nitride coating over the coated fibers of the substrate; and an impermeable metallic carbide, oxide, boride or nitride outer protective layer formed about the entire periphery of the coated substrate. In accordance with the method of the invention, the metallic coating is applied to the fibers in such a manner such that internal porosity of the article is precisely controlled and a flaw resistant, tough, non-catastrophic failing structural ceramic body is formed.

91 Claims, 4 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

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☐ 25. Document ID: US 3653851 A

L9: Entry 25 of 25 File: USPT Apr 4, 1972

US-PAT-NO: 3653851
DOCUMENT-IDENTIFIER: US 3653851 A

TITLE: HIGH-STRENGTH METAL-SILICON CARBIDE ARTICLE

DATE-ISSUED: April 4, 1972

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Gruber; Bernard A.	Boxford	MA		

US-CL-CURRENT: 428/539.5; 106/482, 252/517, 423/345, 428/698, 501/88

ABSTRACT:

Fibrous silicon carbide, substantially free of silicon dioxide, in the form of fibrous beta crystals in intimate admixture with minor amounts of particles of silicon dioxide is disclosed as a composition of matter useful in fluid filtration, heat resistant fabrics, and accoustical insulation. Dispersion of this composition in continuous media such as metals, oxides, ceramics and polymerized organic monomers gives useful articles of manufacture with improved strength, low thermal conductivity and extreme resistance to corrosion.

1 Claims, 0 Drawing figures

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments KWIC | Draw Desc | Image

Generate Collection | Print

Terms	Documents
16 and 18	25

Display Format: Change Format

Previous Page Next Page

WEST

Generate Collection | Print

Search Results - Record(s) 1 through 8 of 8 returned.

☐ 1. Document ID: US 6503572 B1

L11: Entry 1 of 8 File: USPT Jan 7, 2003

US-PAT-NO: 6503572
DOCUMENT-IDENTIFIER: US 6503572 B1

TITLE: Silicon carbide composites and methods for making same

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 2. Document ID: US 6486447 B2

L11: Entry 2 of 8 File: USPT Nov 26, 2002

US-PAT-NO: 6486447
DOCUMENT-IDENTIFIER: US 6486447 B2

TITLE: Method of manufacturing an electric heating element

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 3. Document ID: US 6448538 B1

L11: Entry 3 of 8 File: USPT Sep 10, 2002

US-PAT-NO: 6448538
DOCUMENT-IDENTIFIER: US 6448538 B1

TITLE: Electric heating element

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 4. Document ID: US 6355340 B1

L11: Entry 4 of 8 File: USPT Mar 12, 2002

US-PAT-NO: 6355340
DOCUMENT-IDENTIFIER: US 6355340 B1

TITLE: Low expansion metal matrix composites

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 5. Document ID: US 5483041 A

L11: Entry 5 of 8 File: USPT Jan 9, 1996

US-PAT-NO: 5483041
DOCUMENT-IDENTIFIER: US 5483041 A

TITLE: Thermocouple for a horizontal diffusion furnace

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 6. Document ID: US 5461214 A

L11: Entry 6 of 8 File: USPT Oct 24, 1995

US-PAT-NO: 5461214
DOCUMENT-IDENTIFIER: US 5461214 A
** See image for Certificate of Correction **

TITLE: High performance horizontal diffusion furnace system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 7. Document ID: US 4913738 A

L11: Entry 7 of 8 File: USPT Apr 3, 1990

US-PAT-NO: 4913738
DOCUMENT-IDENTIFIER: US 4913738 A

TITLE: Heat-resistant composite body

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 8. Document ID: US 4846673 A

L11: Entry 8 of 8 File: USPT Jul 11, 1989

US-PAT-NO: 4846673
DOCUMENT-IDENTIFIER: US 4846673 A

TITLE: Process for preparing heat-resistant composite body

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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Generate Collection | Print

Terms	Documents
l6 and l10	8

Display Format: TI Change Format

Previous Page Next Page

WEST

Generate Collection | Print

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☐ 1. Document ID: US 6503572 B1

L12: Entry 1 of 8 File: USPT Jan 7, 2003

US-PAT-NO: 6503572
DOCUMENT-IDENTIFIER: US 6503572 B1

TITLE: Silicon carbide composites and methods for making same

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 2. Document ID: US 6486447 B2

L12: Entry 2 of 8 File: USPT Nov 26, 2002

US-PAT-NO: 6486447
DOCUMENT-IDENTIFIER: US 6486447 B2

TITLE: Method of manufacturing an electric heating element

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 3. Document ID: US 6448538 B1

L12: Entry 3 of 8 File: USPT Sep 10, 2002

US-PAT-NO: 6448538
DOCUMENT-IDENTIFIER: US 6448538 B1

TITLE: Electric heating element

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 4. Document ID: US 6355340 B1

L12: Entry 4 of 8 File: USPT Mar 12, 2002

US-PAT-NO: 6355340
DOCUMENT-IDENTIFIER: US 6355340 B1

TITLE: Low expansion metal matrix composites

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

☐ 5. Document ID: US 5483041 A

L12: Entry 5 of 8 File: USPT Jan 9, 1996

US-PAT-NO: 5483041
DOCUMENT-IDENTIFIER: US 5483041 A

TITLE: Thermocouple for a horizontal diffusion furnace

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 6. Document ID: US 5461214 A

L12: Entry 6 of 8 File: USPT Oct 24, 1995

US-PAT-NO: 5461214
DOCUMENT-IDENTIFIER: US 5461214 A
** See image for Certificate of Correction **

TITLE: High performance horizontal diffusion furnace system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 7. Document ID: US 4913738 A

L12: Entry 7 of 8 File: USPT Apr 3, 1990

US-PAT-NO: 4913738
DOCUMENT-IDENTIFIER: US 4913738 A

TITLE: Heat-resistant composite body

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 8. Document ID: US 4846673 A

L12: Entry 8 of 8 File: USPT Jul 11, 1989

US-PAT-NO: 4846673
DOCUMENT-IDENTIFIER: US 4846673 A

TITLE: Process for preparing heat-resistant composite body

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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Generate Collection | Print

Terms	Documents
l9 and l10	8

Display Format: TI Change Format

Previous Page Next Page

WEST

Help | Logout | Interrupt

Main Menu | Search Form | Posting Counts | Show S Numbers | Edit S Numbers | Preferences | Cases

Search Results -

Terms	Documents
l2 and l10	47

Database:
- US Patents Full-Text Database
- US Pre-Grant Publication Full-Text Database
- JPO Abstracts Database
- EPO Abstracts Database
- Derwent World Patents Index
- IBM Technical Disclosure Bulletins

Search: L13

Refine Search

Recall Text | Clear

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DATE: Wednesday, April 23, 2003 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT; PLUR=YES; OP=OR			
L13	l2 and l10	47	L13
L12	l9 and l10	8	L12
L11	l6 and l10	8	L11
L10	wafer	103204	L10
L9	l6 and l8	25	L9
L8	semiconductor	273072	L8
L7	silicon adj carbide adj film	508	L7
L6	l2 and l3	224	L6
L5	l2 and l4	1	L5
L4	dummy adj wafer	578	L4
L3	fibers or fiber	339324	L3
L2	silicon adj carbide adj composite	396	L2
L1	silicon/siliocn adj carbide	0	L1

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